

# High-Capacity Spacesuit Evaporator Absorber Radiator (SEAR)

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Michael G. Izenzon, Weibo Chen, Scott Phillips, and Ariane Chepko  
*Creare Inc., Hanover, New Hampshire, 03755*

Grant Bue  
*NASA Lyndon B. Johnson Space Center, Houston, TX*

Gregory Quinn  
*United Technologies Corporation Aerospace Systems, Windsor Locks, CT*

Future human space exploration missions will require advanced life support technology that can operate across a wide range of applications and environments. Thermal control systems for space suits and spacecraft will need to meet critical requirements for water conservation and adaptability to highly variable thermal environments. This paper describes a Space Evaporator Absorber Radiator (SEAR) that has been designed to meet performance requirements for future life support systems. A SEAR system comprises a lithium chloride absorber radiator (LCAR) for heat rejection coupled with a space water membrane evaporator (SWME) for heat acquisition. SEAR systems provide heat pumping to minimize radiator size, thermal storage to accommodate variable environmental conditions, and water absorption to minimize use of expendables. We have built and tested a flight-like, high-capacity LCAR, demonstrated its performance in thermal vacuum tests, and explored the feasibility of an ISS demonstration test of a SEAR system. The new LCAR design provides the same cooling capability as prior LCAR prototypes while enabling over 30% more heat absorbing capacity. Studies show that it should be feasible to demonstrate SEAR operation in flight by coupling with an existing EMU on the space station.